

EXPERIMENT-5

Aim: Installation of NS-2/3 Network Simulator: Basics of Network Simulation.

NS-2:

- It stands for Network Simulator-2. It is an event driven simulation tool that is widely used for studying the dynamic nature of the communication networks.
- It can be used for simulating wired as well as wireless network function and protocols like TCP/IP, UDP etc.
- It provides a method for the user to specify network protocols and simulate their corresponding behaviour.

Features of NS-2:

1. It simulates wired and wireless networks.
2. It is primarily Unix-based.
3. It is a discrete simulator.
4. It provides support to a variety of protocols: TCP, FTP, UDP, http and DSR.
5. Uses TCL as its scripting language.

Basic Structure of NS-2:

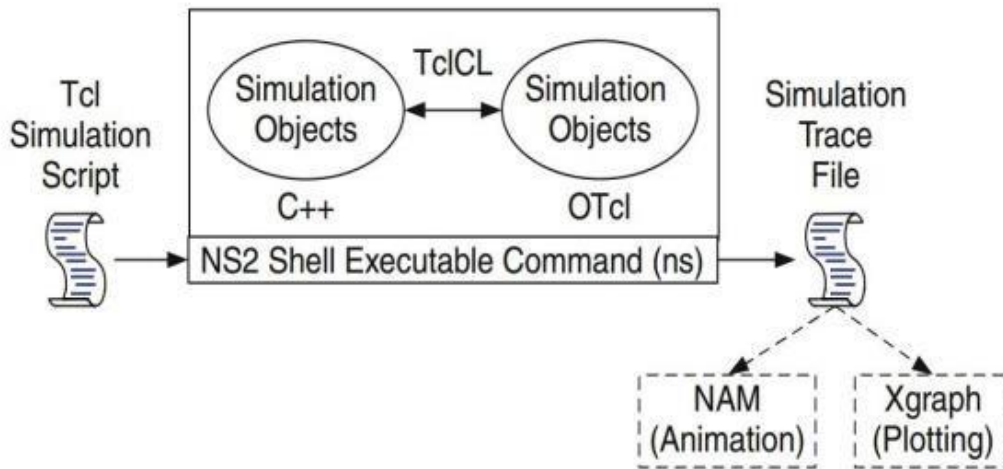
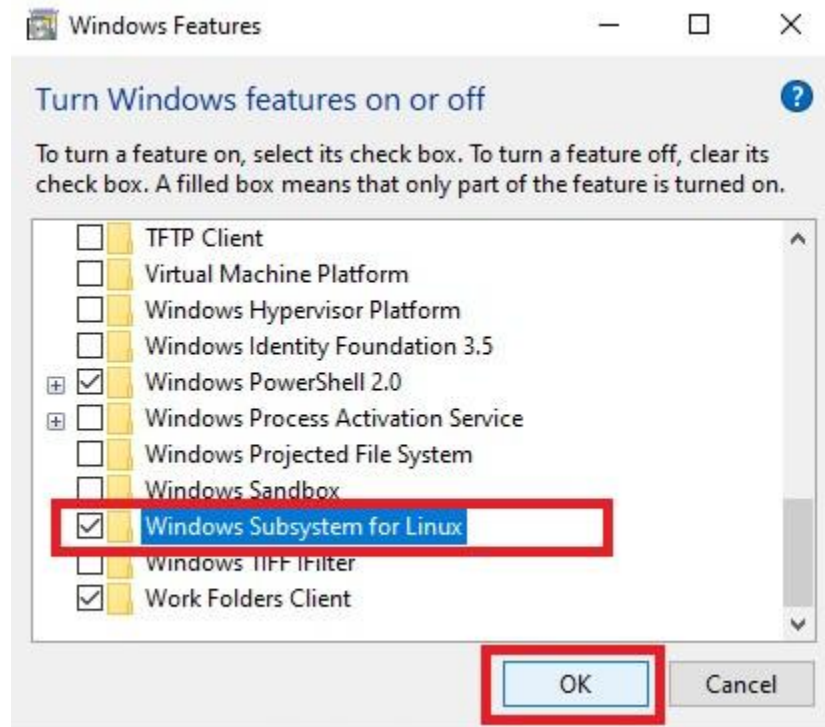


Figure shows the basic architecture of NS2. NS2 provides users with an executable command ns which takes on input argument, the name of a Tcl simulation scripting file. Users are feeding the name of a Tcl simulation script (which sets up a simulation) as an input argument of an NS2 executable command ns.

Installation of NS-2 on Windows:

Step-1: Open Windows Features and Enable Windows Subsystem for Linux:



Step-2: Open Command Prompt and write: `bash`

You will get a link from where you can Download Ubuntu app for windows subsystem.

OR

Install Ubuntu from Microsoft Store:

Click on search and type “Microsoft Store” and click on Open.

In the search bar at the top, type “Ubuntu” and click on “Install” button

Step- 3: Install Xming.

Open Google in a browser and type “Xming Download” or go to this URL <https://sourceforge.net/project s/xming/> and click on the “Download” button.

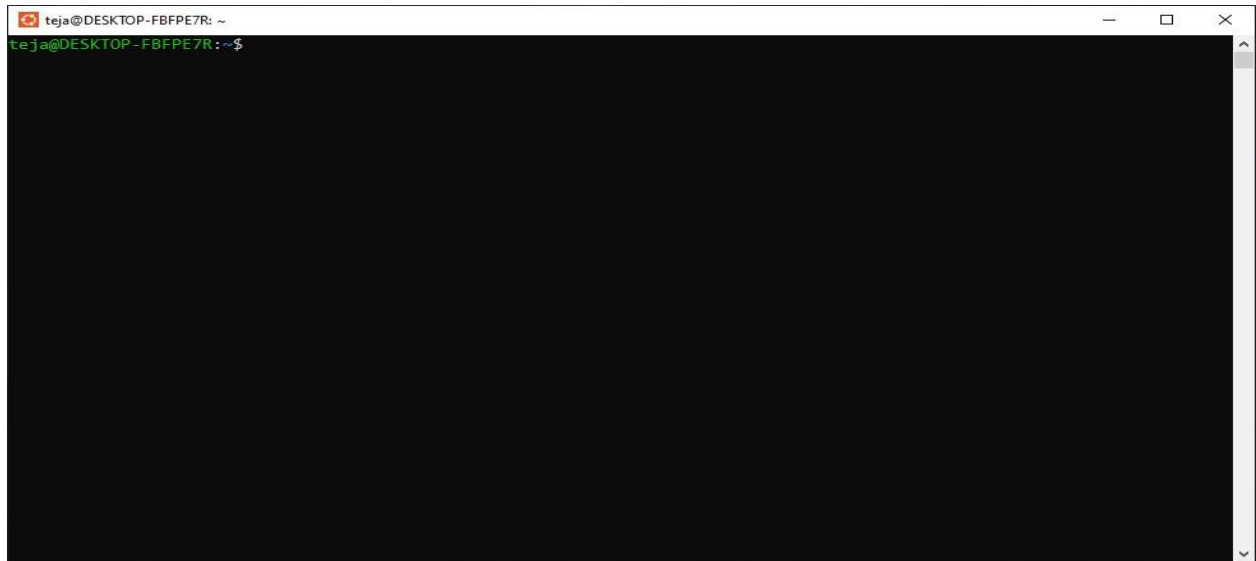
After downloading Xming, install it.

Step- 4: Open search and type “Ubuntu” and click on Open.

As it is the first time you are opening Ubuntu, it will ask for Username and Password.

Give any username and password and hit enter key. Remember this password as it will be asked every time when we do start installation.

Now you should see a prompt as shown below:



Step- 5: Type the following commands one by one and install prerequisite packages:

- `sudo apt update`
- `sudo apt-get install ns2`
- `sudo apt-get install nam`
- `sudo apt-get install gedit`
- `sudo apt install tcl`

If your Internet connection is slow, this step will take some time to complete. When asked for username and password provide them as given before.

Step- 6: Changing the location to working directory.

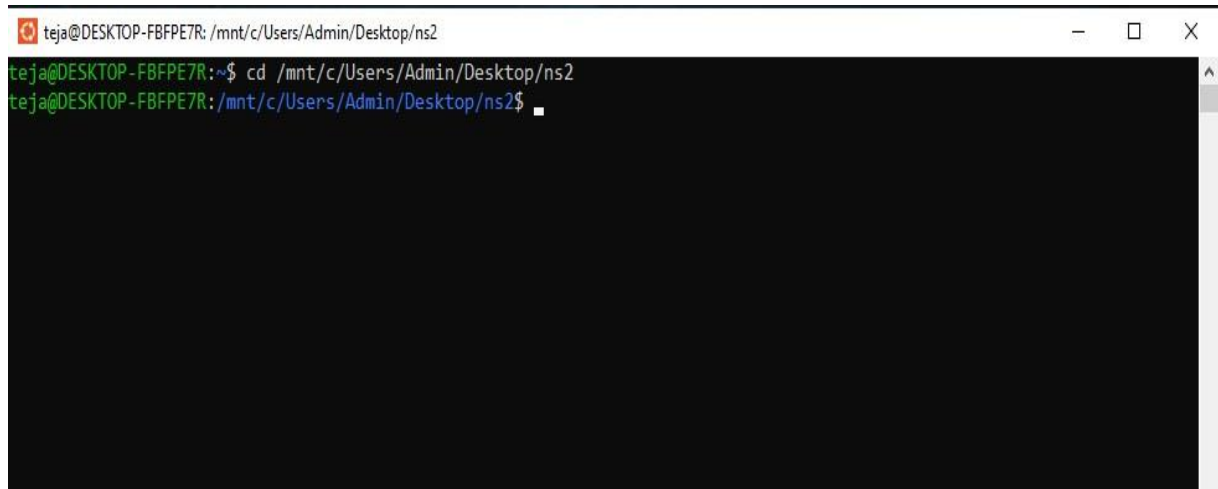
For this example, for working directory name is “ns2” and it is located on my “Desktop”.

The complete path to “ns2” directory on my PC is “C:\Users\Admin\Desktop\ns2”.

To change the location to the above directory, type the following command and hit Enter key.

```
cd /mnt/c/Users/Admin/Desktop/ns2/
```

You can see the above command in action in the below figure:

A terminal window titled 'teja@DESKTOP-FBFPE7R: /mnt/c/Users/Admin/Desktop/ns2'. The prompt is 'teja@DESKTOP-FBFPE7R:~\$'. The user enters 'cd /mnt/c/Users/Admin/Desktop/ns2'. The prompt changes to 'teja@DESKTOP-FBFPE7R:/mnt/c/Users/Admin/Desktop/ns2\$' and a cursor is visible.

```
teja@DESKTOP-FBFPE7R: /mnt/c/Users/Admin/Desktop/ns2
teja@DESKTOP-FBFPE7R:~$ cd /mnt/c/Users/Admin/Desktop/ns2
teja@DESKTOP-FBFPE7R:/mnt/c/Users/Admin/Desktop/ns2$
```

Note the path may vary from system to system. For Example, let suppose ns2 programs are going to be saved in the “ns2” folder as shown above.

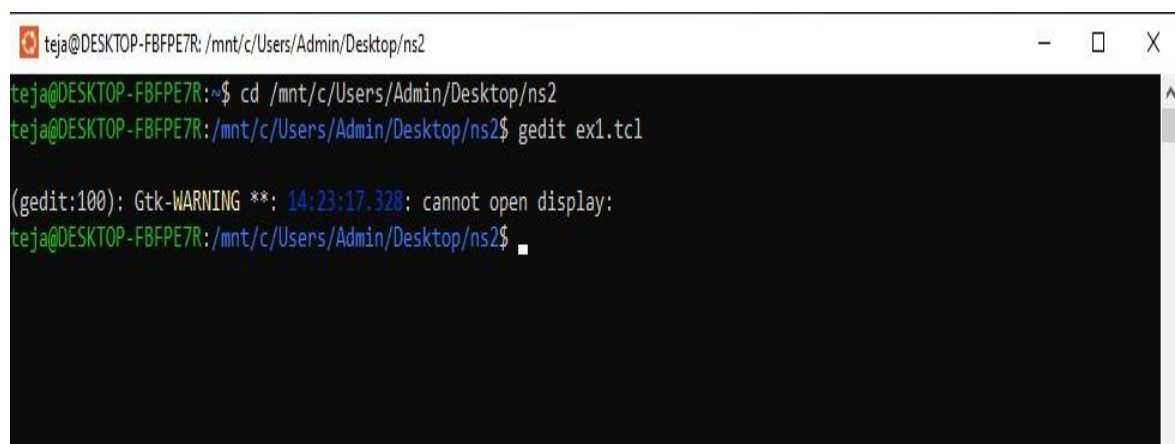
Step- 7: Opening gedit and typing the program.

Type the command: ls

You will get the list of files available here. Let’s file with name ***expl1.tcl*** will display

Then type the following command in the terminal and hit Enter key. gedit exmpl.tcl

You might get a warning message as shown in below figure:

A terminal window titled 'teja@DESKTOP-FBFPE7R: /mnt/c/Users/Admin/Desktop/ns2'. The prompt is 'teja@DESKTOP-FBFPE7R:~\$'. The user enters 'cd /mnt/c/Users/Admin/Desktop/ns2'. The prompt changes to 'teja@DESKTOP-FBFPE7R:/mnt/c/Users/Admin/Desktop/ns2\$'. The user enters 'gedit ex1.tcl'. The prompt changes to '(gedit:100):'. A warning message is displayed: 'Gtk-WARNING **: 14:23:17.328: cannot open display:'. The prompt returns to 'teja@DESKTOP-FBFPE7R:/mnt/c/Users/Admin/Desktop/ns2\$' with a cursor.

```
teja@DESKTOP-FBFPE7R: /mnt/c/Users/Admin/Desktop/ns2
teja@DESKTOP-FBFPE7R:~$ cd /mnt/c/Users/Admin/Desktop/ns2
teja@DESKTOP-FBFPE7R:/mnt/c/Users/Admin/Desktop/ns2$ gedit ex1.tcl
(gedit:100): Gtk-WARNING **: 14:23:17.328: cannot open display:
teja@DESKTOP-FBFPE7R:/mnt/c/Users/Admin/Desktop/ns2$
```

Step- 8: Opening Xming and check the task bar.

For opening the “gedit” application we have to start the “Xming” application.

Open search and type “Xming” and click on “Open”. The “Xming” server will be started and it will be available in the system tray on the taskbar. Sometimes it might get hidden in the system tray and is not always visible.

Now, in the terminal type the following command as shown in the figure below and hit enter key.



```
teja@DESKTOP-FBFPE7R: /mnt/c/Users/Admin/Desktop/ns2
teja@DESKTOP-FBFPE7R:/mnt/c/Users/Admin/Desktop/ns2$ gedit ex1.tcl

(gedit:107): Gtk-WARNING **: 14:25:50.964: cannot open display: 0:0
teja@DESKTOP-FBFPE7R:/mnt/c/Users/Admin/Desktop/ns2$ export DISPLAY=0:0
teja@DESKTOP-FBFPE7R:/mnt/c/Users/Admin/Desktop/ns2$
```

Now, type the following command in the terminal (black window) and hit Enter key. gedit exmpl.tcl

You should be able to see a blank gedit window as shown in below image.



Type the following sample program and save (CTRL + s) the file. Now close gedit window.

```
#Create global variables set
ns [new Simulator]
```

```
#setting nam trace set namf
[open wired1.nam w]
$ns namtrace-all $namf
```

```
#open the trace file set tracef
[open wired1.tr w] $ns
trace-all $tracef
set proto rlm
```

```
#setting the color values
$ns color 1 blue
$ns color 2 yellow
$ns color 3 red
```

```
#----- creating client- router- end server node-----#
set n0 [$ns node] set n1 [$ns node] set n2 [$ns node]
```

```
#establish the link between the nodes
$ns duplex-link $n0 $n1 2Mb 100ms DropTail
$ns duplex-link $n1 $n2 200Kb 100ms DropTail
```

```
#Label the nodes
$ns at 0.0 "$n0 label Client1" $ns
at 0.0 "$n1 label Server"
$ns at 0.0 "$n2 label Client2"
```

```
#setting the color for nodes
$n0 color blue
$n1 color red
$n2 add-mark pradeep green square
```

```
#Shaping the nodes for differentiation
$n1 shape hexagon
$n2 shape square
```

```
#finish procedure proc
finish {} { global ns
tracefnamf $ns flush-
trace close $tracef close
$namf puts "Opening
nam..." exec nam
wired1.nam & exit 0 }
```

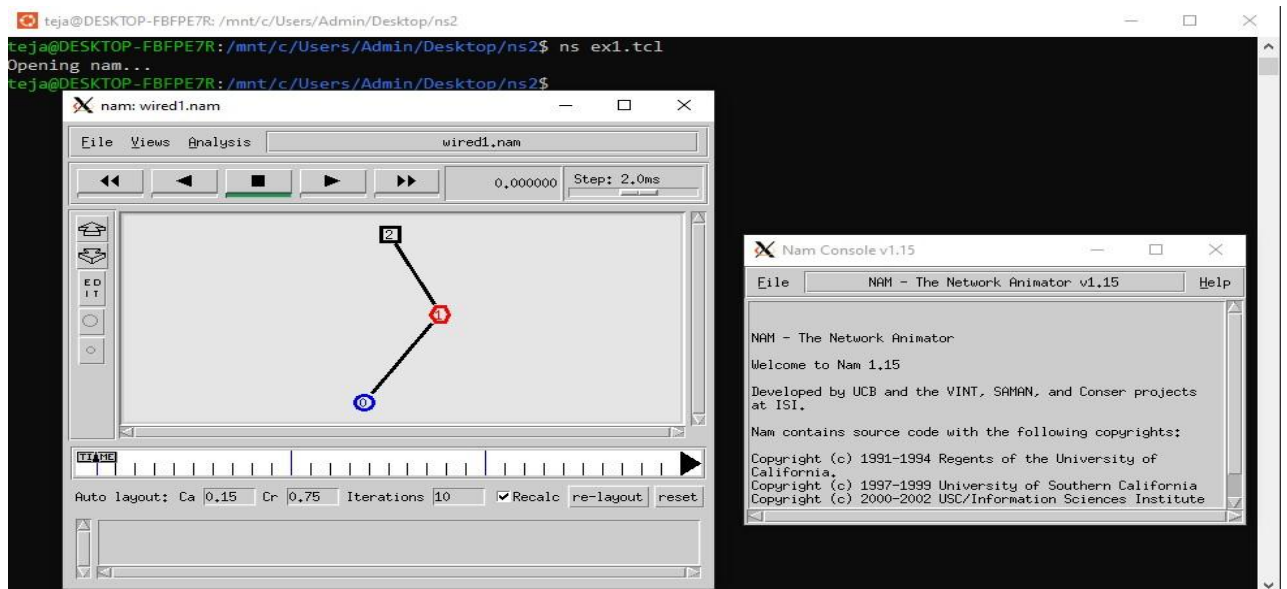
```
#Calling finish procedure
$ns at 2.0 "finish"
$ns run
```

Step- 8: Running the program using “ns” command.

Type the following command in the terminal to run the program and see the output.

```
ns exmpl.tcl
```

Now, you should be able to see the network animator (nam) window with the topology as shown in the below figure.



The above output, shows that we have installed ns2 successfully on system.